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SUBDIVIDING FOR TRAFFIC SAFETY

by Harold Marks

Traffic Survey Engineer, Los Angeles County Road Department

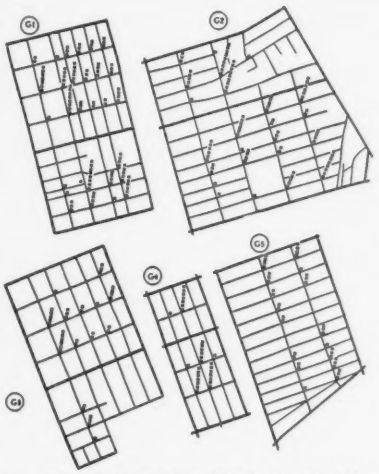

FIGURE 1. Subdivision Design: Gridiron

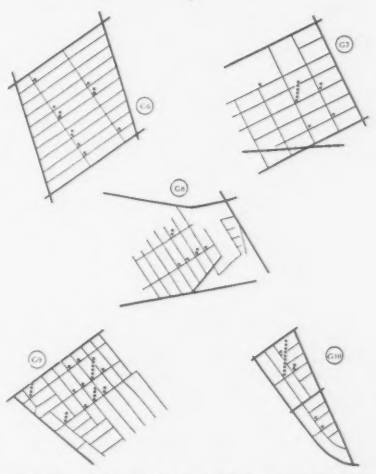

FIGURE 2. Subdivision Design: Gridiron

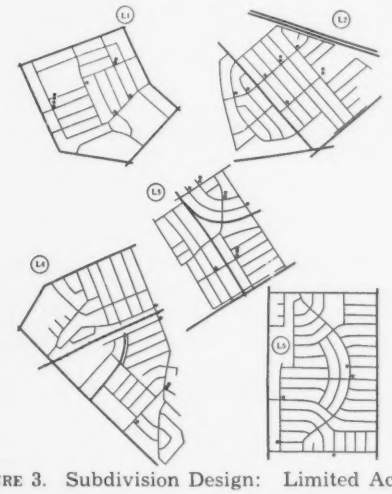

FIGURE 3. Subdivision Design: Limited Access

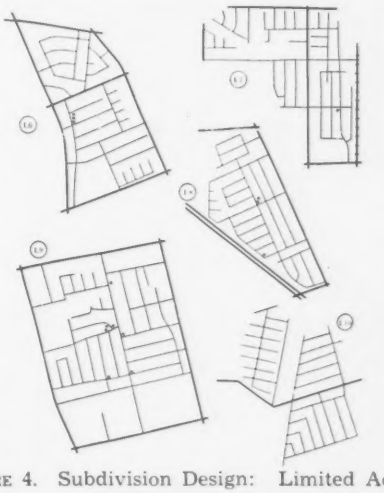

FIGURE 4. Subdivision Design: Limited Access

Comparison of Accident Patterns in Gridiron and Limited Access Subdivisions. **See also Page 3.**
Each x Represents One Accident During the 5-Year Study Period.

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Plan-itorial . . .

"Property in Land"

A Challenge to a Free Society

In a period of history in which more and more centralized authority, governmental intervention, and public regulation are taking place, and in fact are being advocated as the solution to the problems of the State, the Nation and the World, it is encouraging to find a person, who not only challenges this concept in highly effective terms, but offers positive and promising directions which society can take—*if* it is willing to exercise its abilities and restrain its excesses voluntarily by contract rather than through the coercion of government.

The subject is intriguing, but the substance of a recent book, CITADEL, MARKET AND ALTAR by Spencer Heath, in which this "new natural science of society" is set forth is even more so. The fact that Mr. Heath is an engineer and lawyer, and not a sociologist is also refreshing to say the least.

Land and land ownership are at the base of the author's theories for the "emerging society" of the future. John Chamberlain, of the editorial staff of the *Wall Street Journal*, comments in his foreword to Mr. Heath's book, that he isn't sure how far the model system developed by the author can "be pushed."

"It seems likely that until men are angels the State must stand ready to pursue a murderer from one privately owned community to another, and to restrain violent madmen in some extra-community institution. Then, too, there is the problem of the jet planes needed to keep the Messrs. Krushchev and Bulganin at a proper distance. Justice and safety may always require an occasional visit from the tax collector.

"Nevertheless, Mr. Heath's system does not have to be pushed to its logical extreme. Great advantages would undoubtedly accrue to everybody, landlord and renter alike, if a large number of municipal services (now so sloppily and inefficiently rendered) could be brought under the law of the free market.

"Beyond Mr. Heath's way of looking at the man-land problem there is the larger issue of freedom in general. Mr. Heath insists on what should be axiomatic to us in the days of Cold War, that ownership is what confers freedom. To be a free man, one must have the right to a home base, something to stand on without asking any politician's permission. But there is more to freedom—and to ownership—than that. One cannot be truly free unless the product of one's energies can be exchanged for other products in an uncoerced relationship. Free exchange depends on contract and without ownership there can be no contract. Ownership, contract and exchange are thus inseparable links in a chain. Since exchange is the *social* part of economics (as production is personal and physical), ownership and contract are precedents to free social-ization."

Heath's main thesis is simple—that the individual is to society as a whole what the world is to the universe: that the whole of society has a given amount of natural energy; that each part, man society and cosmos, is governed by the same set of natural laws; and that this energy can only be expended effectively in a relationship of action and movement, which is free from collusion, compulsion and coercion.

This freedom can best be attained through interchange of services including those of the community, under contractual agreement. In this process, the ownership, use and productivity of land are paramount.

CITADEL, MARKET AND ALTAR is not an easy book to read, but it is well worth the effort for those sincerely interested in preserving or recapturing the best elements of the free enterprise system. The book is published by The Science of Society Foundation, Inc., 1502 Montgomery Road, Elkridge 27, Maryland, at a price of six dollars. M.S.W.

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CENSUS POPULATION SERVICE

Many communities need special population censuses to qualify for additional State tax revenues and other benefits based on population size. Such up-to-date enumerations are advantageous because many States recognize only Federal censuses for distribution of tax revenues, classification of cities and other matters based on population figures. In a special census, the community, under contract with the Census Bureau, U. S. Department of Commerce, provides office space and qualified enumerators and pays all related expenses. The Bureau is responsible for supervising the census and tabulating the official results.

Community officials interested in a special Federal census may address inquiries to Mr. Robert W. Burgess, Director, Bureau of the Census, Washington 25, D. C., requesting a cost estimate and indicating the approximate population growth which has occurred since the 1950 decennial census.

SUBDIVIDING FOR TRAFFIC SAFETY

by Harold Marks

Traffic Survey Engineer, Los Angeles County Road Department

Editor's Note

By building traffic safety into residential developments, we provide not only for safe street traffic movement but we achieve also good land subdivisions. High standards for traffic safety are compatible with characteristics of street layout which make for livability in residential areas. Both are paramount in today's neighborhoods. Effective results in long-range preservation of property values can be obtained readily through proper original design and layout.

Some time ago the National Committee on Traffic Safety, in cooperation with other agencies, including Urban Land Institute, published a manual on residential street design. It incorporated good subdivision design with features for traffic safety as a guide to help land developers, platting officials, and planners provide for more desirable residential subdivisions. Until now we have not had any other research study relating traffic safety to subdivision design.

In "Subdividing for Traffic Safety," the author, Harold Marks, applies safe traffic movement to new subdivision design concepts. (These concepts he calls "limited-access subdivisions." Customarily we refer to these concepts as "curvilinear street patterns"). This article demonstrates why the old gridiron street patterns are dangerous. It also shows how to readjust existing patterns and to design new ones to cut down on street accidents. This study is based upon research activities conducted by the Road Department, County of Los Angeles. Although the width of roadways is not included in this particular study, street layout is proved to be the element for traffic safety and good subdivision layout.

"Subdividing for Traffic Safety" first appeared in the *Traffic Quarterly* for July 1957. *Traffic Quarterly* is an independent journal for better traffic published by the Eno Foundation of Saugatuck, Connecticut. URBAN LAND is indebted to Eno Foundation for its permission to reprint Mr. Marks' article. Furthermore, URBAN LAND is grateful to Mr. Sam R. Kennedy, Road Commissioner, County of Los Angeles Road Department, for his permission to republish Mr. Marks' article as an incentive for continuation of similar studies by other agencies and organizations.

Since 1948, Harold Marks has been Traffic Survey Engineer of the Los Angeles County Road Department, directing all traffic planning and research. He was formerly freeway design engineer for a New York consulting and engineering firm. Mr. Marks is a Registered Professional Engineer in California and New York, and an associate member of the Institute of Traffic Engineers.

For anyone involved in designing new subdivisions, approving plats or handling traffic, this is an extremely important article.

Are we subdividing for traffic safety? To the planner and engineer our new street patterns for residential subdivisions may obviously appear safer than the old. But other organizations who have a legitimate interest in new design policies may not be easily convinced. The fireman, the policeman, the delivery man—in fact, all who must service these subdivisions have been inconvenienced by the discarding of gridiron street patterns that formerly predominated.

One of the principal objectives of modern design is increased traffic safety. The new patterns were evolved on the basis of extensive experience and judgment. However, many public agencies have been handicapped in past years with inadequate statistics to substantiate these new policies.

In Los Angeles County, this need for basic facts resulted in extensive accident-research studies of new and old subdivision design practices. Not only were we interested in determining whether new designs were safer, but how much safer. If this could be done, the next step was to find out which design features were responsible for this additional safety.

Now, with the completion of some of these studies, it is possible to substantiate opinions with statistics and facts to prove that the advantages of new designs outweigh the obvious disadvantages. Summarized here are the principal findings to date concerning the relative safety of various types of subdivisions and their design features.

This subdivision design research represents one phase of an overall program for improving the safety and efficiency of the Los Angeles County street system. The program is under the sponsorship of the County Board of Supervisors and executed by the road department under the direction of the Road Commissioner.

Scope of Study

The study included eighty-six residential subdivision tracts with a total developed area of 4,320 acres, representing a population of 53,000 persons. It embraced 108 miles of residential streets including 660 intersections.

Subdivision design can be separated into two general types—gridiron and limited access. In recent years limited access has been accepted in most areas as reflecting modern design trends. A basic comparison was therefore made between the performance characteristics of these two types of design. Total areas and population characteristics of the gridiron and limited-access subdivisions studied were approximately the same so a valid comparison could be made. Each of the tracts is protected with the normal types of intersection traffic control, placed according to nationally accepted practices.

The study period included a five-year accident history for each tract. Since right angle collisions represent approximately 84 percent of all vehicular intersection accidents within subdivisions, this initial study has been limited to right angle collisions at intersections of local streets.

Gridiron Subdivisions

Figures 1 and 2 illustrate the accident pattern for a group of gridiron subdivisions. Each x represents one vehicular accident during the five-year study period. The heavier lines are major streets bordering the subdivisions which were not included in this phase of the accident analysis.

The distribution of accidents in most of the tracts is fairly uniform throughout. In fact, an accident pattern appears to develop wherever two continuous streets meet at an intersection. Figure 1 includes urban subdivisions

where the normal grid patterns are interrupted only by schools and parks. These create some three-legged T-type intersections and a few non-continuous streets. It will be noted that the T-type intersections generally have no accident history.

Figure 2 includes some gridiron subdivisions in less urbanized areas. The general distribution of accidents continues but with lesser intensity. Also some tracts are generally gridiron in pattern but assume the characteristics of limited access in some sections. They develop discontinuity at railroads, rivers and other obstructions. In these subdivisions, accidents tend to become concentrated at the intersections of the principal continuous streets serving the tracts. Those areas most limited in access appear to have the fewest accidents.

Limited Access Subdivisions

Figures 3 and 4 illustrate the accident history for a series of limited access tracts for the same five-year period. Particularly interesting is the relative number of accidents in these tracts as compared to the gridiron tracts, and also the distribution of these accidents. There no longer appears to be a uniform pattern of distribution but rather concentrations at a few intersections. Here again, an accident pattern appears to develop wherever two continuous streets meet at a four-legged intersection. Especially significant is the large number of T intersections with practically no accident record.

Tracts which most nearly resemble a grid pattern, including numerous intersections of continuous streets, develop a definite accident pattern. However, the tracts isolated by rivers, flood control channels, railroads and freeways, where access is most severely restricted, appear to have the fewest accidents. This is illustrated by tracts L7, L8 and L10.

Comparative Safety

Figure 5 summarizes general observations with an overall comparison between the relative safety of limited access and gridiron subdivisions. A statistical summary of accident rate and accident frequency is illustrated for all subdivisions studied. The total accident rate for all gridiron subdivisions was 77.7 accidents per year as compared to 10.2 accidents per year for an equivalent area of limited-access subdivisions—an accident ratio of almost eight to one.

In terms of accident frequency 50.0 percent of all intersections in gridiron subdivisions had at least one accident during the five-year period. In contrast, only 8.8 percent of the intersections in the limited-access subdivisions experienced accidents during this period—a frequency ratio of almost six to one. This is particularly significant since there were 65 percent more intersections in the limited-access tracts than in the gridiron tracts.

Distinguishing Features

With such a tremendous variation in the internal accident experience between these two types of subdivision design, it is appropriate to analyze the basic differences that distinguish one from the other.

1. Limited Access

The frequency of access connections to the major highway has been reduced considerably. This has been achieved by providing service roads, back-up design, culs-de-sac, etc.

2. Discontinuity of Streets

In gridiron subdivisions all local streets extend continuously from one major street to another. Limited-access subdivisions seek to eliminate continuity between major streets in order to discourage through-traffic movement.

3. Street Pattern

The gridiron subdivision is characterized by the straight grid street pattern. Limited-access designs have developed such features as curved street alignments, cul-de-sac blocks with turn-around loops, relatively short street runs of one or two block lenghts, 90-degree elbow turns, and other distinguishing features.

4. Collector Streets

In gridiron subdivisions every street is both an access street and a collector street exiting into a major highway. In limited-access subdivisions certain streets act as collectors for the subdivision. Local-access streets enter the collector street either at a three-legged T or at a four-legged intersection, and are generally non-continuous.

5. Intersection Characteristics

The grid pattern results in virtually all 90-degree four-legged intersections. Limited-access designs usually have more intersections but with fewer legs. The new designs have very few four-legged intersections but many more three-legged T intersections.

Three-legged and Four-legged Intersections

Figure 6 illustrates the accident rates of four-legged intersections as compared with three-legged intersections. Only uncontrolled intersections, those without STOP signs, were included in this comparison in order to isolate the effectiveness of the basic design feature, unaffected by traffic control devices.

The accident rate at three-legged T intersections was the same for both types of design, averaging .006 acci-

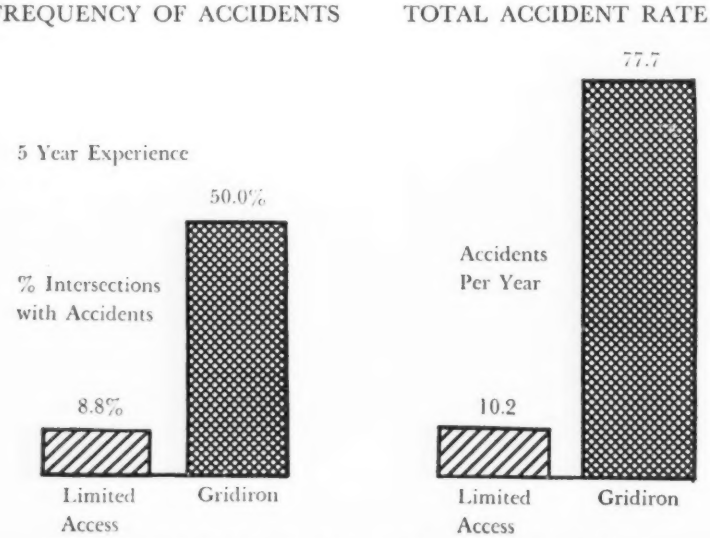

FIGURE 5. Subdivision Design: Gridiron *vs.* Limited Access

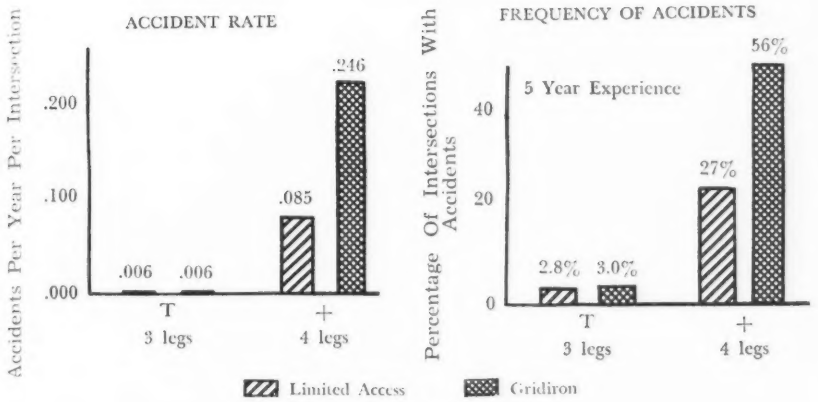

FIGURE 6. Subdivision Design:
Comparison of 3-legged and 4-legged intersections

dents per intersection per year. Thus, for every thousand T intersections, only six experienced even a single accident during a one-year period. In contrast, the accident rates for four-legged intersections were .246 and .085 for the two design types. Gridiron subdivisions had an accident experience three times as great as limited-access subdivisions for the four-legged intersection. Comparing four-legged intersections with three-legged intersections, the ratio of accidents is fourteen to one in limited-access subdivisions and forty-one to one in gridiron subdivisions.

In terms of accident frequency, only 2.8 percent of all T intersections in limited-access subdivisions had even a single accident during the five-year period. This is comparable to the frequency in gridiron subdivisions where 3.0 percent of the T intersections experienced accidents during this period. In contrast, 56 percent of the four-legged intersections in limited-access subdivisions had at least one accident during the five-year period.

Figure 7 illustrates one reason why three-legged intersections are safer. Comparing theoretical traffic conflict points, a three-legged intersection has three potential crossing conflict points whereas a four-legged intersection has sixteen such conflict points.

Another built-in advantage of T intersections is automatic assignment of right-of-way. Vehicles entering the intersection from the discontinuous leg must slow down to turn left or right; they normally expect to yield to traffic on the continuous street which is thus automatically assigned right-of-way. This eliminates the usual indecision as to which vehicle has right-of-way, which is typical of an uncontrolled four-legged intersection.

This detailed analysis of the relative safety of three-legged T intersections as compared to four-legged intersections should not be interpreted to mean that four-legged intersections cannot be used safety. Many four-legged intersections have proved to be relatively safe, as illustrated in tracts L4, L5 and L10. However, it will be seen in these tracts that usually at least two of the intersecting legs are non-continuous, extending for only one block beyond the intersection.

Other Design Features

Studies of less detailed nature have been made of other design features from which some general conclusions can be developed.

In some tracts, relatively long collector streets serve short culs-de-sac and other non-continuous access streets. This design is used effectively in tracts L5, L7, L8 and L10 and a low accident history is indicated. However, collector streets which extend continuously from one major street to another and cross other continuous streets tend to develop an accident pattern, illustrated in tracts L2, L6 and L9. Collector streets offer a satisfactory degree of safety when they exit into only one major street and have no cross conflicts with other continuous streets.

Some design features appear to be particularly accident prone. These include multi-legged intersections of more than four legs; irregular, Y-type intersections where the intersecting legs meet at acute angles; jogs in alignment where the legs are too close together to operate properly as separate T intersections; adjoining intersections too close to operate independently; intersections adjacent to bridges, railroads and other obstructions to clear visibility; and similar features that should be avoided for safe design.

Most of our subdivision accident studies to date concentrated upon internal accident characteristics within the subdivision. Supplementary studies are now under way to determine the accident characteristics where local streets enter major highways. Some preliminary trends have been uncovered which are worthy of consideration.

Limiting of Access

Frequency of access onto major highways appears to be a most important element. Optimum traffic signal spacing along a major highway is normally at least a quarter-mile to achieve progressive traffic movement and speed control. It would therefore be desirable to space access points at quarter-mile intervals and thus serve several purposes. Concentration of all subdivision access at the quarter-mile

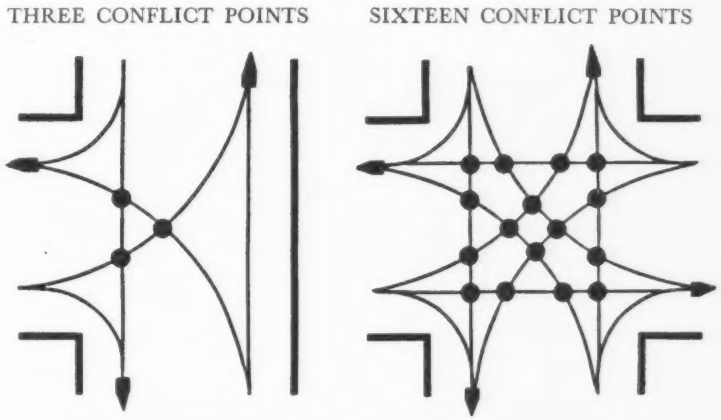

FIGURE 7. Traffic Conflict Points:
Comparison of 2-legged and 4-legged intersections

point would generate sufficient traffic at the entering street to meet minimum traffic signal volume warrants. If traffic is permitted to leave the subdivision at several points, no one point would have sufficient volume to warrant a signal installation. Also, by concentrating all traffic control attention at one point, all traffic entering and leaving the subdivision is given maximum protection.

This built-in traffic safety program should include pedestrians as well as vehicles. If pedestrians are permitted to cross the major street promiscuously wherever they choose, one of the principal advantages of limited access is lost. Pedestrians should also be required to enter and leave the subdivision at these traffic-controlled intersections. This provision is generally achieved by backup, side-on or cul-de-sac design, with a fence or wall provided along the backs of the lots.

Although the requirement may appear somewhat severe, an analysis recently completed indicates that 78 percent of all pedestrian accidents involving school age children occur midblock and are generally attributable to carelessness. It is desirable to provide restrictions upon pedestrian movement as well as vehicular movement to protect persons from their own carelessness.

Wherever it is possible to locate the principal access points at good signal timing locations, the access streets on both sides of the major highway should fall opposite each other for most efficient signalization control. This does not apply to intermediate access streets where there would be little likelihood of future signalization. At such intermediate locations T intersections would normally be preferable to four-legged intersections.

Built-in Traffic Safety

Accident research activities indicate that it is possible to build traffic safety into a subdivision by proper design. An impression prevails that safety can be added later, after the subdivision is built, by using traffic signs, signals and markings. These tools of the traffic engineer cannot correct basic design deficiencies; they can only attempt to minimize effects of faulty design and reduce the number of accidents. A STOP sign is essentially a device used to correct an inherent design weakness. This point is illustrated by many of our limited access subdivisions which do not have a single STOP sign and have very few accidents.

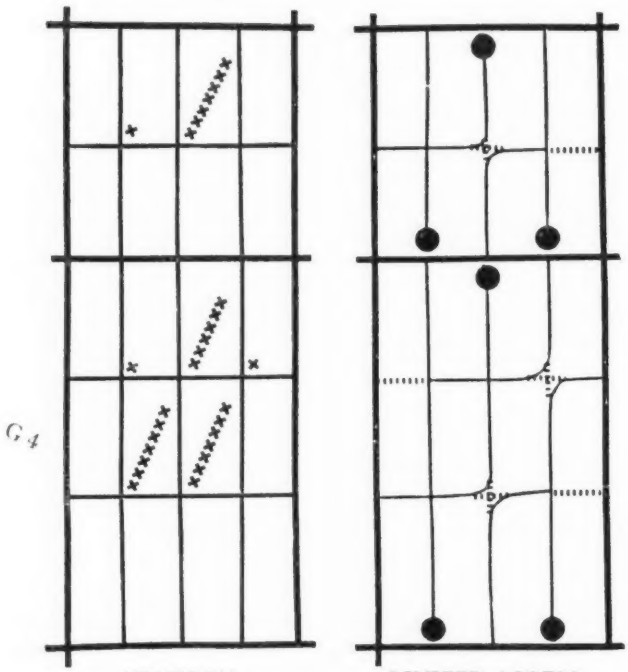

FIGURE 8. Gridiron Subdivision Redesigned

Unlike the planner and the subdivision engineer who are finished with a tract after it is occupied, the traffic engineer's headaches begin after people move in. Any problems developing from design inadequacies come home to roost with the traffic engineer who is the man on the firing line when poor planning results in accidents. He should, for self-defense, take an active interest in subdivision planning to reduce the number of problems he will have to face in the future.

From the wealth of background and experience accumulated in dealing with problems in existing subdivisions, the traffic engineer can frequently anticipate which design features will create similar problems in the future and can thus advise the planner. In any long range traffic safety program, it is considerably more valuable to correct deficiencies in the design stage before they develop, than to place restrictive traffic control devices later.

Elements of Safe Design

Sound planning, based upon knowledge of good design practices, can eliminate built-in traffic hazards we now live with. With the statistics now available, it is possible to develop some conclusions regarding safe design.

1. Limited access design, preferably limited to quarter-mile access points, appears to provide maximum safety.
2. Backup, side-on or cul-de-sac treatment is generally preferable to a service road contiguous to major highways.
3. Continuous through-streets extending from one major street to another should be avoided.
4. Collector streets are satisfactory when there are no continuous cross streets and if they exit into only one major street.
5. Four-legged intersections should be used infrequently, although they are not objectionable where non-continuous access streets join the collector street.
6. T-type intersections should be used more frequently.
7. Such design features as multi-legged intersections with more than four legs, acute angle and Y-type intersections, and jog intersections should be avoided.

Improvement of Existing Subdivisions

The discussion thus far has concerned new subdivision design. Must we assume nothing can be done to improve present subdivisions? It would be interesting to take one of our typical gridiron subdivisions, Figure 8-G4, to determine what could be done from

a design standpoint to correct the present accident problem. This small tract presently averages six accidents a year. Theoretically, the rate could be reduced to less than one accident a year if the street pattern could be transformed into a limited-access design.

One of the basic requirements is relatively simple—that all streets be made discontinuous. It could be redesigned as indicated in Figure 8 by vacating some streets and creating some culs-de-sac and elbows as shown. Theoretically at least, it is possible to transform a gridiron subdivision into a limited-access type by applying new design principles. From an economic standpoint the cost of the improvement would be relatively small and would be more than compensated by the reduction of traffic accidents.

Of course, the key point is the feasibility of such a proposal. It may appear perfectly sound from a theoretical standpoint, but is it practical? One can always find a hundred people who can prove that nothing can be done about anything—particularly anything as radical as changing an existing street pattern. The only trouble with this objection is that street patterns have been changed in some areas—and very successfully.

A notable example, reported last year in a national magazine, involved a formerly quiet residential neighborhood rapidly deteriorating from through-traffic and the accompanying noise and accidents. Local gridiron streets attracted about 2000 vehicles a day that by-passed the bordering main streets. Home owners wondered why they couldn't have the same protection from through-traffic as new subdivisions have.

After considerable study they found out that they could. A community improvement association, in conjunction with the technical services provided by their governmental agencies, developed a program of street improvements whereby all continuous street-runs were broken by traffic diverters, turn-arounds, and culs-de-sac. The relatively minor cost was more than re-paid by rising home values and fewer accidents. Now the local streets have reverted to their former purpose of serving the residents safely and efficiently.

What has been accomplished successfully in one area can be applied elsewhere. Increased traffic safety would be a prime objective of this type of improvement but it would also have many desirable by-products. It is basically a new concept in urban redevelopment. Not only does it offer a method of protecting an older subdivision from traffic hazards and noise, but also from the resulting neighborhood blight, property depreciation, and loss of residential character and attractiveness.

It is not a panacea for all older subdivisions but it has merit worthy of serious consideration. As with any basic change there are many practical problems. One is inertia. Public acceptance, even engineering acceptance, may be hard to obtain; but it is offered as one solution to many of our local traffic dilemmas—a solution proved successful.

Future Applications

Even considering the limited number of studies completed to date, I believe it is possible to say with some degree of confidence that we are subdividing for traffic safety. We can show how much safer certain design features are compared with others. This data can be used to support our design policies. Our new subdivisions have built-in traffic safety. Perhaps of even greater significance for the future, the same principles that provide greater safety in new subdivisions can be applied to older subdivisions whenever we are ready to accept this new concept. Since most traffic accidents on local streets occur in older gridiron subdivisions, that is where the greatest improvement of traffic safety can be achieved in the future.

Much remains to be done in this field before we have all of the answers. This one of several studies under way illustrates the new factual approach to street design—an approach based upon accident experience. The principal symptom of poor design is the history of excessive traffic accidents.

Undesirable design elements will normally be reflected in the relative performance of a street as a safe traffic-carrier. Thus, a wider application of accident statistics for engineering analysis can provide a sound foundation for an overall program of accident reduction.

ULI MEMBERSHIP

Institute services and publications are available as follows: $10 per year subscription for students and libraries; $25 membership for corporations, associations, public agencies, and their representatives; $100 Sustaining membership with Community Builders' or Industrial Council affiliation.

ULI'S NEW STAFF MEMBERS

URBAN LAND readers will be interested to learn that as of October 1, Robert E. Boley has joined the ULI staff as Secretary of the Industrial Council. Mr. Boley is a native of Washington, D. C., and a graduate of George Washington University where he majored in Industrial Geography. During World War II he served in the U. S. Air Force in the Pacific Theatre.

After leaving the Air Force, Mr. Boley served as Geographer with the Federal Government and was a member of the research team of the George Washington University Geography Department which evaluated the effects of environment on military operations during both World War II and the Korean conflict.

During the past two years Mr. Boley has directed the work of the Industrial Development Committee of Prince George's County, Maryland, authorized by the Maryland State Legislature in 1955. Mr. Boley's association with the staff will permit further extension of the work of the Industrial Council.

On July 1, Granville H. Crabtree, Jr., was appointed research analyst on the Institute's staff. Mr. Crabtree's services will make possible more extensive research studies and analyses. He comes to the Institute following completion of graduate studies in Business Administration, University of Missouri. Currently through evening courses, he is studying toward a degree at George Washington University School of Law, Washington, D. C. Mr. Crabtree is a native of Florida, served in the Korean conflict and holds the rank of Captain, U. S. Army Reserves.

In Print

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Are New Residential Areas a Tax Liability? George H. Esser, Jr., Institute of Government, University of North Carolina, Chapel Hill. 1956, 30 pp. (mimeo.) $1.00.

The financial impact from annexing subdivisions is examined in this special study for the City of Greensboro, N. C. It is part of a larger suburban analysis released earlier. Under the city's present service standards and existing financial policies, it will receive more revenue over a period of years than it costs to service property. This statement contradicts findings generally true elsewhere that residential areas cost more to serve than they contribute in revenues. According to this study, the reasons why Greensboro subdivisions produce revenue can be attributed to (1) the State's tax policy in providing financial support for schools not based on ad valorem property values; (2) the city's policy in financing costs over $6 per front foot for street paving and curbs and gutters; (3) property valuation procedures; and (4) careful administrative control over quality of services rendered to residential areas. From four hypothetical subdivisions with differing lot sizes, the study concludes that annexation of well-developed subdivisions is a sound business proposition for the city provided water mains and sewer interceptors can be extended economically. Annexation before land development is better than after subdivisions are built.

The Economic Effects of Limited Access Highways and Bypasses. Second Edition. (A Bibliography). Joseph W. Harrison. Prepared for Virginia Council of Highway Investigation and Research, Charlottesville, Virginia. August 1957. 19 pp.

The vast nation-wide highway program involves many economic factors affecting real estate values. This well-put-together bibliography contains 107 references concerning economic effects on land value, land use and the volume and composition of business. Each listed reference, if not explanatory in itself, has a short descriptive paragraph which enables the researcher to locate his material quickly.

Boundary Control and Legal Principles. Curtis M. Brown. John Wiley & Sons, Inc., New York 16, N. Y. 1957. 275 pp., illus., charts, tables. $7.50.

This book was written primarily for use by abstractors, surveyors, title engineers and attorneys, but land developers, subdividers and planners will also find the book a valuable reference on real property concepts. There are sections dealing with subdivisions, background material on real property, and a neatly arranged section on deeds including a glossary of terms. The real purpose of the book is to bring legal principles into focus with the surveyor's methods of working with real property.

Pattern For Progress 1957. An Economic Base Study of the Wichita, Kansas Metropolitan Area. City Planning Commission, Wichita, Kansas. 1957. 220 pp., maps, charts, tables. $2.50.

Many cities have recently made economic base studies. Some have been good, while others have been mediocre or poor. However, this one from Wichita rates among the best.

Since 1940 few cities have experienced a more rapid growth of population, employment and income than has Wichita. During this twenty year period, it has changed from a basically agricultural economy to its present industrial composition (due primarily to the aircraft industry). This rapid "doubling-in-size" growth makes Wichita a unique city for an economic base study. The information compiled by this research is the kind that is necessary for sound planning and for analyzing the facts about the economic stability of a community. The report's findings and methods should be of interest to all areas resting upon a strong economic base, but primarily dependent upon one factor for that strength.

Components of Population Change, 1940-50: Estimates of Net Migration and Natural Increase for Each Standard Metropolitan Area and State Economic Area. Donald J. Bogue. Published jointly by the Scripps Foundation for Research in Population Problems, Miami University, Oxford, Ohio, and the Population Research and Training Center, University of Chicago, Chicago, Ill. 1957. pp. v + 145., tables and charts. $3.75.

Demographers contend that there are only two ways in which a population can change in size—through reproductive changes ("natural increase") and net migration.

Using data from the 1940-50 censuses for this pilot study, the author explores the practicability and possibility of using these two components as a basis for a study of population growth. The system is described in detail and is undoubtedly informative to those interested in statistical methods. The planner and developer will find the material useful for background population analysis in standard metropolitan areas.

IMPACT OF EXPRESSWAY INTERCHANGES ON PLANT LOCATION

Industry is becoming aware of advantages from sites located with ready access to expressway interchanges. Combinations of factors help make these sites especially attractive to new or expanding industries as well as to plants seeking new locations:

- Proximity to free-flowing express highway facilities allows for readier access to suppliers and markets.
- Faster time with more safety in expressway travel helps industries find a wider range for securing employees.
- Size of available open tracts permits construction of one-story plants, ample parking, and flexibility in providing for future expansion.

Boston's circumferential expressway, State Route 128, is the prize example of how limited access highways can stimulate industrial development in suburban areas. As reported in the Area Development Bulletin of the U. S. Department of Commerce, Charles D. Curtiss, Commissioner, Bureau of Public Roads, has termed Route 128 one of Massachusetts' most valuable assets in having attracted, within the past few years, a diversified group of industries located at intervals along the route representing an investment of well over $100 million.

Similar events are taking place elsewhere. New York State's Thruway is attracting new industrial development near strategic interchange points. The Eastshore Freeway in Alameda County, California, has been analyzed by the California Division of Highways. There it was found that the study area comprised only 9 percent of the total industrial acreage in the County but it accounted for 43 percent of the dollars invested in new industry, 30 percent of the number of new industries, 38 percent of the dollars invested in industrial expansion and 32 percent of the number of expansions.

These experiences suggest an extended role for expressways as a factor in future plant site location. With the new Federal-aid interstate highway system coming into being, it is paramount that potential industrial sites located within access to these expressways be preserved through proper planning and zoning.